have now written to you proves for the interior of the earth on the supposition of a thin preternaturally rigid crust.

I must apologise to you for having troubled you with so long a letter. I did not intend to make it so long when I commenced, but I have been led on by considerations of details, inevitable when such a subject is once entered upon.—I remain, yours very truly,

WILLIAM THOMSON

G. Poulett Scrope, Esq., F.R.S.

THE SOLAR ECLIPSE

IN the communication to NATURE, written from Ootacamund, I promised another when I was in possession of more information as to the work done, not only by the British Association parties, but by those representing the Indian and French Governments. Let me now endeavour to redeem my promise, seeing that since that communication was penned I have had the happiness of hearing from M. Janssen's own lips an account of what he did; have met Captain Waterhouse, the last representative at Ootacamund of Colonel Tennant's party; have visited Mr. Pogson at Madras, who obligingly gave me an account of the results obtained at Avenashi; and last, but not least, have learnt since my return home that the Jaffna party were successful, not only with the polariscope, but also with the camera and spectroscope.

Within a few minutes of the despatch of my last article I found that Captain Waterhouse, who assisted Mr. Hennessy in exposing the photographic plates taken by Colonel Tennant's party, was still at Ootacamund, and this welcome intelligence was soon followed by Captain Waterhouse himself, who was so good as to bring with him a drawing of one of the photographs; the plates themselves having been taken down the ghaut by Colonel Tennant, with the intention of comparing them at Pothonore with those taken by Mr. Davis. Unfortunately, as has been already stated, we missed each other, and so an absolute comparison of photographs did not take place; but from the drawing it was evident that in the two series the main form of the corona was the same. The photographs I learned were very sharp and good, and one appreciates their value the more when it is known that only a very little time before they were taken, any success, even a partial one, seemed out of the question, so persistently did cloud and mist hang over Dodabet on the eventful morning. I gathered that the spectroscopic observations had also been successful, and that a continuous spectrum with 1474 had been observed. If more lines than this were not seen, it is easily to be accounted for by the relatively long focal length of the object-glass employed to throw an image of the eclipsed sun on the slit.

Not until the morning after my interview with Captain Waterhouse did I learn the whereabouts of Dr. Janssen, who, from a study of the habits of the clouds and their prevailing drift, had concluded that the neighbourhood of Ootacamund was not the best that could be chosen. He had consequently taken his departure, and it seemed at first as if his whereabouts was known to no one. At last, however, Prof. Respighi and myself came upon his spoor; he was at Sholoor, on the N.E. flank of the range, at the solitary house of a tea-planter, to which there was no road, but which might be reached on ponies if a guide to it could be found. This guide Captain Sargeant, of the Revenue Department, obligingly provided, and in no very long time we reached the beautiful spot which Dr. Janssen had chosen.

It will be better that I should state his results in his own words. In a letter[*] to Prof. De La Rive, dated December 26, he thus writes :—

“J'ai été favorisé par un ciel d'une pureté presque absolue. Cette circonstance, et surtout les dispositions optiques toutes nouvelles que j'avais prises, m'ont permis de faire sur la couronne des constatations qui démontrent son origine solaire (pour la meilleure partie).

“Dans mon télescope,[†] le spectre de la couronne s'est montré non pas continu, mais remarquablement complexe. J'y ai constaté :

“Les raies brillantes du gaz hydrogène qui forme le principal élément des protubérances et de la chromosphère.

“La raie brillante verte déjà signalée aux éclipses de 1869 et 1870, et quelques autres plus faibles.

“Des raies obscures du spectre solaire ordinaire, notamment D. Ces raies sont beaucoup plus difficiles à apercevoir.

“Mes observations prouvent que, indépendamment des matières cosmiques qui doivent exister dans le voisinage du Soleil, il existe autour de cet astre une atmosphère très étendue, excessivement rare, à base d'hydrogène.

“Cette atmosphère, qui forme sans doute la dernière enveloppe gazeuse du Soleil, s'alimente de la matière des protubérances, lancée avec une si grande violence, des entrailles de la photosphère. Mais elle se distingue de la chromosphère et des protubérances, par une densité énormément plus faible, une température moins élevée, et peut-être par la présence de certain gaz différents.

“Il y a donc lieu de distinguer cette nouvelle atmosphère solaire. Je propose de la nommer *atmosphère coronale*, désignation qui rappelle que c'est elle qui produit la meilleure partie des phénomènes lumineux qui ont été désignés jusqu'ici sous le nom de couronne solaire.

“En annonçant ce résultat, je n'oublie pas, quant à moi, tout ce que nous devons aux travaux qui l'ont préparé, notamment ceux des astronomes américains aux éclipses de 1869 et 1870.”

It will be seen that the importance of the brilliancy of the image, so strongly insisted upon by the Eclipse Committee in their Instructions, had been fully recognised by Dr. Janssen, whose instrument had more light even than those used by the British parties, who used “Browning With” reflectors of 9¼ inches aperture, and some 6 feet focus.

Although my account, in this place and at this time can only be of the most general character, the coincidence obtained by Janssen, Respighi, and myself on one point may be briefly referred to, namely, the distinct proof obtained by each of us that above the most vivid chromospheric layer, and even the prominences, we have hydrogen with its most familiar bright lines, and with much of the “structure” of its spectrum; these proofs being derived not only from the old method of inquiry, but from the new one employed by Professor Respighi and myself.

We spent the remainder of the day at Sholoor in mounting the hill at the back of the house to see the observatory, and to admire the wonderful view of the plains of Mysore, which was visible between a break in the hills; while the immediate neighbourhood, with its water-

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[*] Bibliothèque Universelle, January 15, 1872, p. 103.

[†] Ce télescope a une ouverture de 0^{m} 37, et 1^{m} 42 seulement de distance focale. Les images y sont de 12 à 16 fois plus lumineuses que dans une lunette astronomique ordinaire. Le spectroscope avait été construit pour utiliser toute cette lumière.

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falls, massive peaks, rocks here, and patches of wood there, steep ravines and tea-clad valleys, presented us with a scene of perfect beauty.

Next morning we were away before sunrise on our way to Mr. Pogson, whom we found at the Madras Observatory, preparing to exchange time signals with the Jaffna party. Three photographs were taken by Mr. Pogson at Avenashi, but the instrument used was so different from those used at Bekul and Dodabet (not to mention Jaffna) that it is difficult to institute a comparison in the time at my disposal; but it is not to be doubted that they will be of the highest importance when the general results come to be discussed. Mr. Pogson was assisted in the observations by his son and Mr. Chisholm, the Government architect, who was highly successful in sketching the corona and the eclipse effects upon the landscape.

Come we last to Jaffna. In my former article I referred only to the polariscope and spectroscope work done there. I have since learned that six photographs were taken with the sister instrument to the one used at Bekul.

The observations, in fact, were a perfect success. The morning was clear and bright, and could not have been finer had any one so wished.

At about six o'clock the party and those who were to assist them began to assemble on the Belfry Bastion in the Fort. Capt. Tupman observed with a polariscope and drew during the eclipse, and was assisted by Capt Varian of the *Serendib* as his time-keeper; Mr. Lewis with his telescope and polariscope was stationed inside the hut, with the photographic party, and Mr. Thwaites, Deputy Queen's Advocate, who was assisted by the carpenter of the *Serendib.* Capt. Fyers, R.E., with the spectroscope, had for his assistant Mr. W. S. Murray, Deputy Fiscal; and Capt. Hogg, R.E., who presided over the photographic department, was assisted by Mr. Twynam, Government agent, and Mr. J. W. Simpson. By these observers the polariscope results were arrived at, a telegraphic summary of which I quoted in my last communication. Six photographs were taken, being one more than we obtained at Bekul; and in the clockwork-driven integrating spectroscope the reversal of the dark lines was seen at the beginning of totality, and the hydrogen bright lines and 1474 during totality. No information yet about intensities.

Sketches were made by Mr. Foenander, of the Surveyor-General's Department, Colombo; Mr. Pargiter, Assistant Government Agent; Mr. Vine, M.C.E., of the Public Works Department; Mr. Carmichael and Mr. Layard of the O.B.C.

The crowd of natives round the Belfry Bastion was very great; they set up a most hideous howl directly totality commenced, fancying that the end of the world was at hand. They were under the impression that the whole of the Expedition with assistants and all here during the eclipse were going to get into a balloon and off to the sun and not return.

It will thus be seen that the hopes of those interested in the various expeditions of this year have not been disappointed. The composition and structure of a part of the corona have been for ever set at rest, while we have seventeen photographs, taken by instruments of the same power and pattern, to compare with each other—eleven taken at the ends of a base line some 400 miles long, and six at an intermediate elevated point, whereby it was hoped to test the influence of the atmosphere on the observed phenomena. Whether the slight mist will have prevented this or not remains to be proved; but anyhow here is a wealth of records unequalled before, and we may hope to learn much of the outer coronal regions from their comparison, not only *inter se*, but with Mr. Holiday's admirable drawings, showing considerable changes, which have also come to hand.

J. NORMAN LOCKYER

THE ADMIRALTY MANUAL OF SCIENTIFIC INQUIRY

A Manual of Scientific Inquiry; Prepared for the Use of Officers in Her Majesty's Navy and Travellers in General. 4th Edition. Superintended by the Rev. Robert Main, M.A., F.R.S., Radcliffe Observer at Oxford. Pp. 392. (John Murray, 1871.)

IN one of the earlier numbers of the *Philosophical Transactions* may be found a long list of observations proposed to be made by travellers who were about to visit the Peak of Teneriffe. Athanasius Kircher, in his *China Illustrata*, had given an account of such great marvels, that the less credulous, even of those days, wondered and almost doubted; and it was thought to be of advantage to know whether unicorns and dragons really did exist in foreign parts, whether diamonds grew, and what was the precise nature of that "poyson which turneth a man's bloud to gelly." Long afterwards the Royal Society issued instructions for the Antarctic Expedition, hints for collecting information in China, and a book entitled "What to Observe," but there was no general manual for the use of observant travellers, directing them specially not only what to observe, but how to observe. In 1849 the Lords Commissioners of the Admiralty, conceiving that "it would be to the honour and advantage of the Navy, and conduce to the general interests of Science, if new facilities and encouragement were given to the collection of information upon scientific subjects by the officers, and more particularly by the medical officers, of Her Majesty's Navy when upon foreign service," gave orders for the compilation of "The Admiralty Manual." The work was originally edited by Sir John Herschel, and was divided into various sections, each the work of some competent authority.

The work is divided into four parts. The first includes astronomy, hydrography, and tides; the second terrestrial magnetism, meteorology, atmospheric tides; the third geography, statistics, medical statistics, ethnology; and the fourth geology, mineralogy, seismology, zoology, botany. In this last edition all the articles are brought *en rapport* with the progress of science since 1849; the article on tides by Dr. Whewell is revised by the present editor of the book; the articles on statistics, medical statistics, ethnology, geology, mineralogy, botany, have also been revised by other than the original authors. There are two capital maps, the one to illustrate hydrographic delineation; the other to show the approximate limits of the great currents and drifts of the ocean.

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